

## PATENT ABSTRACTS OF JAPAN

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## (54) MUCOPOLYSACCHARIDE AND METHOD FOR PRODUCING THE SAME

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a method for producing a mucopolysaccharide in a short time at a low cost as possible.

SOLUTION: The mucopolysaccharide is produced by degreasing, deodorizing, decoloring, filtering and drying an aqueous solution obtained by subjecting cartilages of fish to an enzymic treatment or an alkaline treatment. In other aspect, the mucopolysaccharide is produced by subjecting the aqueous solution obtained by pressurizing the cartilages of the fish to an enzymic treatment, and degreasing, deodorizing, decoloring, filtering and drying the treated product. As a result, the mucopolysaccharide such as chondroitin sulfuric acid can be produced in a short time at a low cost. The produced mucopolysaccharide can be utilized as, for example, a raw material for cosmetics, and a food material.

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**CLAIMS**

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**[Claim(s)]**

[Claim 1] The manufacture approach of a mucopolysaccharide which decolorizes [ degreases the water solution which enzyme-processed, or carried out alkali treatment and obtained the cartilage of fishes, deodorizes, and ] and filters, and is characterized by drying.

[Claim 2] The manufacture approach of a mucopolysaccharide which degreases, deodorizes, decolorizes and filters [ carry out alkali treatment and ], and is characterized for the water solution which carried out pressure treatment of the cartilage of fishes, and obtained it by enzyme processing or drying.

[Claim 3] The mucopolysaccharide characterized by being manufactured by claim 1 or the manufacture approach of 2.

[Claim 4] The mucopolysaccharide according to claim 3 characterized by being a cosmetics raw material or a food raw material.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the mucopolysaccharide manufactured from the cartilage of fishes.

[0002]

[Description of the Prior Art] For example, into the cartilage of fishes called the cartilages nasi of a salmon etc., it is clear by the old research study that mucopolysaccharides, such as chondroitin sulfate, exist. Moreover, by recently, using the chondroitin sulfate of the cartilages-nasi origin of a salmon for the charge of makeup, food, etc. is examined.

[0003] Conventionally, JP,2001-231497,A and JP,2001-247602,A are indicated as an approach of manufacturing a mucopolysaccharide from the cartilages nasi of a salmon etc. After carrying out low temperature grinding of the cartilages nasi of a salmon etc. at 30-60 degrees C of minus and degreasing, he is trying to acquire mucopolysaccharides, such as chondroitin sulfate, by the approach of these former by carrying out alkali treatment and heating, carrying out enzyme processing, drying the digestive juices after ethanol precipitate, filtration, and centrifugal separation, and freeze-drying after the dissolution / filtration by ion-exchange resin further.

[0004]

[Patent reference 1] JP,2001-231497,A [the patent reference 2] JP,2001-247602,A [0005]

[Problem(s) to be Solved by the Invention] However, by the conventional manufacture approach, since a lot of ethanol is needed using ion exchange resin in the case of filtration, a manufacturing cost will become high and a mucopolysaccharide will become a large sum fairly. Moreover, in order to perform ethanol precipitate, filtration, and centrifugal separation several times, the time amount which manufacture takes will become long.

[0006] Therefore, the object of this invention is to offer the approach that a mucopolysaccharide can be manufactured, by low cost if possible for a short time.

[0007]

[Means for Solving the Problem] In order to attain this object, according to this invention, the manufacture approach of a mucopolysaccharide which degreases the water solution which enzyme-processed, or carried out alkali treatment, and obtained the cartilage of fishes, deodorizes, decolorizes, filters, and is characterized by drying is offered. Moreover, according to this invention, the manufacture approach of a mucopolysaccharide which carries out enzyme processing of the water solution which carried out pressure treatment of the cartilage of fishes, and obtained it, degreases, deodorizes, decolorizes, filters, and is characterized by drying is offered.

[0008] Moreover, if it is in this invention, it is characterized by being the mucopolysaccharide manufactured by such manufacture approach. In this way, the manufactured mucopolysaccharide is used as for example, a cosmetics raw material or a food raw material.

[0009] In this invention, a shark, a ray, a salmon, etc. are illustrated as fishes, for example. Moreover, as a cartilage of fishes, the cartilages nasi of a salmon is illustrated, for example. If it is in this invention, it carries out enzyme processing of the water solution which pressurizes at about 120 degrees C for about 1 hour, was dissolved, and obtained the cartilage of fishes, for example and filters [ degrease, deodorize, decolorize and ], and a mucopolysaccharide is manufactured by drying. According to this invention, mucopolysaccharides, such as chondroitin sulfate, can be manufactured now by low cost in a short time by making it dry and skipping the process of freeze drying after the dissolution / filtration by ion exchange resin further after ethanol precipitate, filtration, and centrifugal separation.

[0010] In addition, the presentation of the mucopolysaccharide manufactured will change with differences of the approach of dissolving the cartilage of fishes. The food raw material which consists of a mucopolysaccharide manufactured by this invention was not browned even if blended with vitamin C.

[0011]

[Embodiment of the Invention] Hereafter, the gestalt of desirable operation of this invention is explained.

[0012] First, the cartilages nasi separated from the head of a salmon except for epidermis, a bone, meat, etc. is obtained.

[0013] Next, the cartilages nasi is dissolved and a water solution is obtained. in this case, the cartilages nasi — alkali treatment — or enzyme processing can be carried out and a water solution can be obtained. Moreover, it may pressurize, for example at about 120 degrees C (1.2 atmospheric pressures) for about 1 hour, and the cartilages nasi may be dissolved.

[0014] Next, proteolytic enzyme (pro tee ase) is mixed with the obtained water solution.

[0015] Then, insoluble matter is removed, filter aid is put in and it filters with the filter press. In this case, when there is the need for deodorization, activated carbon is put in and it filters with the filter press.

[0016] Next, spray drying of the water solution is carried out by spray dry. You may condense before desiccation. In this way, chondroitin sulfate can be manufactured by low cost in a short time.

[0017] In this way, the manufactured chondroitin sulfate is the so-called mucopolysaccharide, chondroitin sulfate is distributed and the collagen is distributed an average of ten to 40% of the weight an average of 20 to 60% of the weight at a rate of 20 - 40 % of the weight of amino acid as a result of analysis. Moreover, little hyaluronic acid and a glucosamine are also contained.

[0018] Moreover, according to the gestalt of another operation of this invention, the cartilage of fishes is dissolved using at least one of alkali or the enzymes, a water solution is obtained, and it degrades [ it PH-adjusts, filters and ], deodorizes, decolorizes and dries.

[0019] Specifically, 40 degrees C - 50 degrees C warm water washes the cartilage of a salmon first for 1 hour to 2 hours (cleaning and deodorization). In this case, a hydrochloric acid may wash (cleaning and deodorization).

At this time, a bone, a hide, and fish meat may adhere to the cartilage. When it processes at pressure treatment and an elevated temperature, a product may discolor.

[0020] Subsequently, the water of tales doses is added to a cartilage, and proteolytic enzyme (AROAZE) of 0.2% of solid content concentration is put into this water solution, it stirs at 50 degrees C - 60 degrees C for 4 hours, and a water solution is obtained.

[0021] Then, at 95 degrees C, it heats for 5 minutes and enzyme deactivation is carried out.

[0022] Furthermore, activated carbon is added by 2.5% of weight to a raw material, it stirs at 40 degrees C - 50 degrees C for 1 hour to 2 hours, and cleaning, deodorization, and decolorization are performed.

[0023] Subsequently, an acetic acid adjusts pH to 5-6.

[0024] Subsequently, a filter aid is added and it filters with the filter press (cleaning). The obtained water solution may be condensed. Liquids are separated, when a water solution is left and an oil content floats (cleaning).

[0025] Subsequently, it dries by spray dry.

[0026] In this way, the obtained mucopolysaccharide contains amino acid, hyaluronic acid, a glucosamine, etc., including 40% [ of chondroitin sulfate ], and collagen 20%.

[0027] Moreover, 40 degrees C - 50 degrees C warm water washes the cartilage of a salmon for 1 hour to 2 hours (cleaning and deodorization). A hydrochloric acid may wash (cleaning and deodorization). At this time, a bone and fish meat may adhere to the cartilage. When it processes at pressure treatment and an elevated temperature, a product may discolor.

[0028] Subsequently, the water of the one half of a cartilage is added and a water solution is obtained. In this water solution, proteolytic enzyme (pancreatin) is put in 0.1% of the weight, and it stirs at 40 degrees C - 50 degrees C for 1 hour.

[0029] Subsequently, above 90 degrees C, it heats for 10 minutes and enzyme deactivation is carried out.

[0030] Subsequently, an acetic acid adjusts pH to 5-6.

[0031] Subsequently, a filter aid is added and it filters with the filter press after deodorization. The obtained water solution may be condensed. Liquids are separated, when a water solution is left and an oil content floats (cleaning).

[0032] Subsequently, in addition, precipitate is collected, stirring a water solution for the alcohol of concentration 50% of the weight.

[0033] Subsequently, reduced pressure drying of the collected precipitate is carried out.

[0034] In this way, the obtained mucopolysaccharide contains amino acid, hyaluronic acid, a glucosamine, etc., including 60 % of the weight of chondroitin sulfate, and 10 % of the weight of collagens.

[0035] Moreover, warm water washing of the cartilage of a salmon is carried out at 40 degrees C – 50 degrees C for 1 hour – 2 hours (cleaning and deodorization). A hydrochloric acid may wash (cleaning and deodorization).

At this time, a bone and fish meat may adhere to the cartilage. When it processes at pressure treatment and an elevated temperature, a product may discolor.

[0036] Subsequently, the water solution into which the alkali (caustic alkali of sodium) of concentration was put 2% of the weight to the amount of cartilages 25% of the weight is obtained. This water solution is stirred at 50 degrees C – 60 degrees C for 4 hours.

[0037] Subsequently, an acetic acid adjusts pH to 6–7.

[0038] Subsequently, further, activated carbon is added by 0.3% of the weight of weight to a water solution, it stirs for 15 minutes at 80 degrees C, and cleaning, deodorization, and decolorization are performed with enzyme deactivation.

[0039] Subsequently, a filter aid is added and it filters with the filter press (cleaning). The obtained water solution may be condensed. Liquids are separated, when a water solution is left and an oil content floats (cleaning).

[0040] Subsequently, it is made to dry by spray dry.

[0041] In this way, the obtained mucopolysaccharide contains amino acid, hyaluronic acid, a glucosamine, etc., including 20% [ of chondroitin sulfate ], and collagen 30%.

[0042]

[Example] (Example 1) The cartilages nasi separated from the head of a salmon except for epidermis, a bone, meat, etc. was obtained first. And 1.5 times as many water as this was added to the raw material (cartilages nasi), and pressure heating was carried out at 120 degrees C for 1 hour, and the cartilages nasi was dissolved and it considered as the water solution. Then, insoluble matter was removed, 0.2% of the weight of proteolytic enzyme (pro tee ase) was put in to solid content concentration, and it stirred at 60 degrees C for 1 hour. And at 95 degrees C, it heated for 5 minutes and enzyme deactivation was carried out. Furthermore, activated carbon was added by 0.3% of the weight of weight to the water solution, and it stirred at 80 degrees C for 15 minutes (cleaning, deodorization, and decolorization). Subsequently, filter aid was put in, spray drying of the water solution filtered and filtered with the filter press was carried out, and the mucopolysaccharide was obtained. In the analysis value of the obtained mucopolysaccharide, 7 % of the weight of loss on dryings, 5 % of the weight of ash content, 0.2 % of the weight of salinity, 0.3 % of the weight of fats, 11 % of the weight of total nitrogen, 62 % of the weight of protein, 30 % of the weight of chondroitin sulfate, and 40 % of the weight of collagens were included.

[0043] (Example 2) 50-degree C warm water washed the cartilage of a salmon first for 2 hours. The water of tales doses was added to this cartilage, 0.2% of the weight of the proteolytic enzyme (AROAZE) of a raw material was put in, and it stirred at 50 degrees C for 4 hours, and considered as the water solution. Then, at 95 degrees C, it heated for 5 minutes and enzyme deactivation was carried out. Furthermore, activated carbon was added by 2.5% of the weight of weight to the raw material, it stirred at 50 degrees C for 2 hours, and cleaning, deodorization, and decolorization were performed. And after adjusting pH to 6, the filter aid was added and it filtered with the filter press (cleaning). Furthermore, it dried by spray dry and the mucopolysaccharide was obtained. The obtained mucopolysaccharide contained amino acid, hyaluronic acid, a glucosamine, etc., including 40 % of the weight of chondroitin sulfate, and 20 % of the weight of collagens. Yield was 6.5%.

[0044] (Example 3) 45-degree C warm water washed the cartilage of a salmon first for 2 hours (cleaning and deodorization). Half water was added to the cartilage, proteolytic enzyme (pancreatin) was put into this 0.1% of the weight, it stirred at 50 degrees C for 2 hours, and the water solution was obtained. And above 90 degrees C, it heated for 10 minutes and enzyme deactivation was carried out. Furthermore, after the acetic acid adjusted pH to 6, the filter aid was added and it filtered with the filter press after deodorization. Furthermore, in addition, reduced pressure drying of the precipitate which collected and collected precipitate was carried out, stirring the alcoholic water solution of concentration 50% of the weight. The obtained mucopolysaccharide contained amino acid, hyaluronic acid, a glucosamine, etc., including 60 % of the weight of chondroitin sulfate, and 10 % of the weight of collagens. Yield was 3%.

[0045] (Example 4) 45-degree C warm water washed the cartilage of a salmon first for 2 hours (cleaning and deodorization). To the amount of cartilages, the alkali (caustic alkali of sodium) of concentration was put in 2%

of the weight 25% of the weight, this was stirred at 55 degrees C for 4 hours, and the water solution was obtained. And the acetic acid adjusted pH to 7, further, activated carbon was added by 0.3% of the weight of weight to the water solution, it stirred for 15 minutes at 80 degrees C, and cleaning, deodorization, and decolorization were performed with enzyme deactivation. Then, the filter aid was added, and it filtered with the filter press (cleaning), and dried by spray dry. The obtained mucopolysaccharide contained amino acid, hyaluronic acid, a glucosamine, etc., including 20 % of the weight of chondroitin sulfate, and 30 % of the weight of collagens. Yield was 5%.

[0046] (Example 5) The cartilages nasi separated from the head of a salmon except for epidermis, a bone, meat, etc. was obtained. And 1.5 times as many water as this was added to the raw material (cartilages nasi), and pressure heating was carried out at 120 degrees C for 1 hour, and the cartilages nasi was dissolved and it considered as the water solution. Then, insoluble matter was removed, the alkali (caustic alkali of sodium) of concentration was put in 2% of the weight 25% of the weight to the amount of cartilages, and this was stirred at 55 degrees C for 4 hours. And the acetic acid adjusted pH to 7, further, activated carbon was added by 0.3% of the weight of weight to the water solution, it stirred for 15 minutes at 80 degrees C, and cleaning, deodorization, and decolorization were performed with enzyme deactivation. Then, the filter aid was added, and it filtered with the filter press (cleaning), and dried by spray dry. The obtained mucopolysaccharide contained amino acid, hyaluronic acid, a glucosamine, etc., including 20 % of the weight of chondroitin sulfate, and 30 % of the weight of collagens. Yield was 6%.

[0047] Next, the health food (tablet) which uses as a principal component the mucopolysaccharide (60 % of the weight of chondroitin contents) manufactured by this invention was created, human being sampled actually, and the situation was investigated. The mucopolysaccharide contains 60 % of the weight of chondroitin sulfate, 10 % of the weight of collagens, 20 % of the weight of amino acid, and 2.0 % of the weight of hyaluronic acid. 12-grain (3.6g) intake of the tablet which is 300mg per grain with which the lactose was blended with for beer yeast in 3.0 % of the weight 7.0% of the weight 8.0% of the weight, and sucrose fatty acid ester was blended [ vitamin C ] for the difficulty slaking property dextrin in it 10.0% of the weight 45.5% of the weight was carried out to this mucopolysaccharide at the day. An intake period is 30 days. Consequently, the result of a table 1 was obtained.

[0048]

[A table 1]

氏名 (イニシャル)	年齢	性別	試飲結果
MS	20代	女性	一週間程で肌に潤い感じた。
YU	20代	女性	10日位で、友人に最近肌が綺麗になったねと言われた。
RA	20代	女性	便秘が解消した。
AO	30代	女性	朝起きた時に肌のハリを感じる。化粧のりがよくなった。
TW	30代	女性	少し痩せた。
YO	30代	女性	生理時の吹き出物が無かった。
MK	30代	男性	利尿数が増えた。
YI	30代	男性	マラソンで傷めた関節痛が楽になった。
YK	40代	女性	関節の痛みが和らいだ。
KN	40代	女性	元気になった気がする。
MI	40代	女性	肌にハリが出てきた気がする。
KT	40代	男性	かすみ目が治った。
MK	40代	男性	疲れがとれた。
HY	50代	女性	関節の痛みが無くなった。二枚爪が治った。
NT	50代	女性	肌のハリを感じる。
MK	50代	女性	関節の痛みが無くなった。
HM	60代	女性	関節の痛みが無くなった。
TS	60代	女性	肌の調子が良くなった。
TK	60代	男性	関節の痛みが無くなった。

[0049]

[Effect of the Invention] According to this invention, a mucopolysaccharide can be manufactured now by low cost in a short time. Moreover, chondroitin sulfate, a collagen and amino acid, hyaluronic acid, the superior cosmetics raw material composed from a glucosamine, and a food raw material can be manufactured from one raw material.

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TECHNICAL FIELD

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[Field of the Invention] This invention relates to the mucopolysaccharide manufactured from the cartilage of fishes.

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PRIOR ART

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[Description of the Prior Art] For example, into the cartilage of fishes called the cartilages nasi of a salmon etc., it is clear by the old research study that mucopolysaccharides, such as chondroitin sulfate, exist. Moreover, by recently, using the chondroitin sulfate of the cartilages-nasi origin of a salmon for the charge of makeup, food, etc. is examined.

[0003] Conventionally, JP,2001-231497,A and JP,2001-247602,A are indicated as an approach of manufacturing a mucopolysaccharide from the cartilages nasi of a salmon etc. After carrying out low temperature grinding of the cartilages nasi of a salmon etc. at 30-60 degrees C of minus and degreasing, he is trying to acquire mucopolysaccharides, such as chondroitin sulfate, by the approach of these former by carrying out alkali treatment and heating, carrying out enzyme processing, drying the digestive juices after ethanol precipitate, filtration, and centrifugal separation, and freeze-drying after the dissolution / filtration by ion-exchange resin further.

[0004]

[Patent reference 1] JP,2001-231497,A [the patent reference 2] JP,2001-247602,A

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EFFECT OF THE INVENTION

[Effect of the Invention] According to this invention, a mucopolysaccharide can be manufactured now by low cost in a short time. Moreover, chondroitin sulfate, a collagen and amino acid, hyaluronic acid, the superior cosmetics raw material composed from a glucosamine, and a food raw material can be manufactured from one raw material.

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TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] However, by the conventional manufacture approach, since a lot of ethanol is needed using ion exchange resin in the case of filtration, a manufacturing cost will become high and a mucopolysaccharide will become a large sum fairly. Moreover, in order to perform ethanol precipitate, filtration, and centrifugal separation several times, the time amount which manufacture takes will become long.  
[0006] Therefore, the object of this invention is to offer the approach that a mucopolysaccharide can be manufactured, by low cost if possible for a short time.

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MEANS

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[Means for Solving the Problem] In order to attain this object, according to this invention, the manufacture approach of a mucopolysaccharide which degrades the water solution which enzyme-processed, or carried out alkali treatment, and obtained the cartilage of fishes, deodorizes, decolorizes, filters, and is characterized by drying is offered. Moreover, according to this invention, the manufacture approach of a mucopolysaccharide which carries out enzyme processing of the water solution which carried out pressure treatment of the cartilage of fishes, and obtained it, degrades, deodorizes, decolorizes, filters, and is characterized by drying is offered. [0008] Moreover, if it is in this invention, it is characterized by being the mucopolysaccharide manufactured by such manufacture approach. In this way, the manufactured mucopolysaccharide is used as for example, a cosmetics raw material or a food raw material.

[0009] In this invention, a shark, a ray, a salmon, etc. are illustrated as fishes, for example. Moreover, as a cartilage of fishes, the cartilages nasi of a salmon is illustrated, for example. If it is in this invention, it carries out enzyme processing of the water solution which pressurizes at about 120 degrees C for about 1 hour, was dissolved, and obtained the cartilage of fishes, for example and filters [ degrease, deodorize, decolorize and ], and a mucopolysaccharide is manufactured by drying. According to this invention, mucopolysaccharides, such as chondroitin sulfate, can be manufactured now by low cost in a short time by making it dry and skipping the process of freeze drying after the dissolution / filtration by ion exchange resin further after ethanol precipitate, filtration, and centrifugal separation.

[0010] In addition, the presentation of the mucopolysaccharide manufactured will change with differences of the approach of dissolving the cartilage of fishes. The food raw material which consists of a mucopolysaccharide manufactured by this invention was not browned even if blended with vitamin C.

[0011]

[Embodiment of the Invention] Hereafter, the gestalt of desirable operation of this invention is explained.

[0012] First, the cartilages nasi separated from the head of a salmon except for epidermis, a bone, meat, etc. is obtained.

[0013] Next, the cartilages nasi is dissolved and a water solution is obtained. in this case, the cartilages nasi — alkali treatment — or enzyme processing can be carried out and a water solution can be obtained. Moreover, it may pressurize, for example at about 120 degrees C (1.2 atmospheric pressures) for about 1 hour, and the cartilages nasi may be dissolved.

[0014] Next, proteolytic enzyme (pro tee ase) is mixed with the obtained water solution.

[0015] Then, insoluble matter is removed, filter aid is put in and it filters with the filter press. In this case, when there is the need for deodorization, activated carbon is put in and it filters with the filter press.

[0016] Next, spray drying of the water solution is carried out by spray dry. You may condense before desiccation. In this way, chondroitin sulfate can be manufactured by low cost in a short time.

[0017] In this way, the manufactured chondroitin sulfate is the so-called mucopolysaccharide, chondroitin sulfate is distributed and the collagen is distributed an average of ten to 40% of the weight an average of 20 to 60% of the weight at a rate of 20 - 40 % of the weight of amino acid as a result of analysis. Moreover, little hyaluronic acid and a glucosamine are also contained.

[0018] Moreover, according to the gestalt of another operation of this invention, the cartilage of fishes is dissolved using at least one of alkali or the enzymes, a water solution is obtained, and it degrades [ it PH-adjusts, filters and ], deodorizes, decolorizes and dries.

[0019] Specifically, 40 degrees C - 50 degrees C warm water washes the cartilage of a salmon first for 1 hour to 2 hours (cleaning and deodorization). In this case, a hydrochloric acid may wash (cleaning and deodorization).

At this time, a bone, a hide, and fish meat may adhere to the cartilage. When it processes at pressure treatment and an elevated temperature, a product may discolor.

[0020] Subsequently, the water of tales doses is added to a cartilage, and proteolytic enzyme (AROAZE) of 0.2% of solid content concentration is put into this water solution, it stirs at 50 degrees C – 60 degrees C for 4 hours, and a water solution is obtained.

[0021] Then, at 95 degrees C, it heats for 5 minutes and enzyme deactivation is carried out.

[0022] Furthermore, activated carbon is added by 2.5% of weight to a raw material, it stirs at 40 degrees C – 50 degrees C for 1 hour to 2 hours, and cleaning, deodorization, and decolorization are performed.

[0023] Subsequently, an acetic acid adjusts pH to 5–6.

[0024] Subsequently, a filter aid is added and it filters with the filter press (cleaning). The obtained water solution may be condensed. Liquids are separated, when a water solution is left and an oil content floats (cleaning).

[0025] Subsequently, it dries by spray dry.

[0026] In this way, the obtained mucopolysaccharide contains amino acid, hyaluronic acid, a glucosamine, etc., including 40% [ of chondroitin sulfate ], and collagen 20%.

[0027] Moreover, 40 degrees C – 50 degrees C warm water washes the cartilage of a salmon for 1 hour to 2 hours (cleaning and deodorization). A hydrochloric acid may wash (cleaning and deodorization). At this time, a bone and fish meat may adhere to the cartilage. When it processes at pressure treatment and an elevated temperature, a product may discolor.

[0028] Subsequently, the water of the one half of a cartilage is added and a water solution is obtained. In this water solution, proteolytic enzyme (pancreatin) is put in 0.1% of the weight, and it stirs at 40 degrees C – 50 degrees C for 1 hour.

[0029] Subsequently, above 90 degrees C, it heats for 10 minutes and enzyme deactivation is carried out.

[0030] Subsequently, an acetic acid adjusts pH to 5–6.

[0031] Subsequently, a filter aid is added and it filters with the filter press after deodorization. The obtained water solution may be condensed. Liquids are separated, when a water solution is left and an oil content floats (cleaning).

[0032] Subsequently, in addition, precipitate is collected, stirring a water solution for the alcohol of concentration 50% of the weight.

[0033] Subsequently, reduced pressure drying of the collected precipitate is carried out.

[0034] In this way, the obtained mucopolysaccharide contains amino acid, hyaluronic acid, a glucosamine, etc., including 60 % of the weight of chondroitin sulfate, and 10 % of the weight of collagens.

[0035] Moreover, warm water washing of the cartilage of a salmon is carried out at 40 degrees C – 50 degrees C for 1 hour – 2 hours (cleaning and deodorization). A hydrochloric acid may wash (cleaning and deodorization).

At this time, a bone and fish meat may adhere to the cartilage. When it processes at pressure treatment and an elevated temperature, a product may discolor.

[0036] Subsequently, the water solution into which the alkali (caustic alkali of sodium) of concentration was put 2% of the weight to the amount of cartilages 25% of the weight is obtained. This water solution is stirred at 50 degrees C – 60 degrees C for 4 hours.

[0037] Subsequently, an acetic acid adjusts pH to 6–7.

[0038] Subsequently, further, activated carbon is added by 0.3% of the weight of weight to a water solution, it stirs for 15 minutes at 80 degrees C, and cleaning, deodorization, and decolorization are performed with enzyme deactivation.

[0039] Subsequently, a filter aid is added and it filters with the filter press (cleaning). The obtained water solution may be condensed. Liquids are separated, when a water solution is left and an oil content floats (cleaning).

[0040] Subsequently, it is made to dry by spray dry.

[0041] In this way, the obtained mucopolysaccharide contains amino acid, hyaluronic acid, a glucosamine, etc., including 20% [ of chondroitin sulfate ], and collagen 30%.

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[Translation done.]

## \* NOTICES \*

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- 2.\*\*\* shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

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EXAMPLE

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[Example] (Example 1) The cartilagines nasi separated from the head of a salmon except for epidermis, a bone, meat, etc. was obtained first. And 1.5 times as many water as this was added to the raw material (cartilagines nasi), and pressure heating was carried out at 120 degrees C for 1 hour, and the cartilagines nasi was dissolved and it considered as the water solution. Then, insoluble matter was removed, 0.2% of the weight of proteolytic enzyme (pro tee ase) was put in to solid content concentration, and it stirred at 60 degrees C for 1 hour. And at 95 degrees C, it heated for 5 minutes and enzyme deactivation was carried out. Furthermore, activated carbon was added by 0.3% of the weight of weight to the water solution, and it stirred at 80 degrees C for 15 minutes (cleaning, deodorization, and decolorization). Subsequently, filter aid was put in, spray drying of the water solution filtered and filtered with the filter press was carried out, and the mucopolysaccharide was obtained. In the analysis value of the obtained mucopolysaccharide, 7 % of the weight of loss on dryings, 5 % of the weight of ash content, 0.2 % of the weight of salinity, 0.3 % of the weight of fats, 11 % of the weight of total nitrogen, 62 % of the weight of protein, 30 % of the weight of chondroitin sulfate, and 40 % of the weight of collagens were included.

[0043] (Example 2) 50-degree C warm water washed the cartilage of a salmon first for 2 hours. The water of tales doses was added to this cartilage, 0.2% of the weight of the proteolytic enzyme (AROAZE) of a raw material was put in, and it stirred at 50 degrees C for 4 hours, and considered as the water solution. Then, at 95 degrees C, it heated for 5 minutes and enzyme deactivation was carried out. Furthermore, activated carbon was added by 2.5% of the weight of weight to the raw material, it stirred at 50 degrees C for 2 hours, and cleaning, deodorization, and decolorization were performed. And after adjusting pH to 6, the filter aid was added and it filtered with the filter press (cleaning). Furthermore, it dried by spray dry and the mucopolysaccharide was obtained. The obtained mucopolysaccharide contained amino acid, hyaluronic acid, a glucosamine, etc., including 40 % of the weight of chondroitin sulfate, and 20 % of the weight of collagens. Yield was 6.5%.

[0044] (Example 3) 45-degree C warm water washed the cartilage of a salmon first for 2 hours (cleaning and deodorization). Half water was added to the cartilage, proteolytic enzyme (pancreatin) was put into this 0.1% of the weight, it stirred at 50 degrees C for 2 hours, and the water solution was obtained. And above 90 degrees C, it heated for 10 minutes and enzyme deactivation was carried out. Furthermore, after the acetic acid adjusted pH to 6, the filter aid was added and it filtered with the filter press after deodorization. Furthermore, in addition, reduced pressure drying of the precipitate which collected and collected precipitate was carried out, stirring the alcoholic water solution of concentration 50% of the weight. The obtained mucopolysaccharide contained amino acid, hyaluronic acid, a glucosamine, etc., including 60 % of the weight of chondroitin sulfate, and 10 % of the weight of collagens. Yield was 3%.

[0045] (Example 4) 45-degree C warm water washed the cartilage of a salmon first for 2 hours (cleaning and deodorization). To the amount of cartilages, the alkali (caustic alkali of sodium) of concentration was put in 2% of the weight 25% of the weight, this was stirred at 55 degrees C for 4 hours, and the water solution was obtained. And the acetic acid adjusted pH to 7, further, activated carbon was added by 0.3% of the weight of weight to the water solution, it stirred for 15 minutes at 80 degrees C, and cleaning, deodorization, and decolorization were performed with enzyme deactivation. Then, the filter aid was added, and it filtered with the filter press (cleaning), and dried by spray dry. The obtained mucopolysaccharide contained amino acid, hyaluronic acid, a glucosamine, etc., including 20 % of the weight of chondroitin sulfate, and 30 % of the weight of collagens. Yield was 5%.

[0046] (Example 5) The cartilagines nasi separated from the head of a salmon except for epidermis, a bone, meat, etc. was obtained. And 1.5 times as many water as this was added to the raw material (cartilagines nasi),

and pressure heating was carried out at 120 degrees C for 1 hour, and the cartilages nasi was dissolved and it considered as the water solution. Then, insoluble matter was removed, the alkali (caustic alkali of sodium) of concentration was put in 2% of the weight 25% of the weight to the amount of cartilages, and this was stirred at 55 degrees C for 4 hours. And the acetic acid adjusted pH to 7, further, activated carbon was added by 0.3% of the weight of weight to the water solution, it stirred for 15 minutes at 80 degrees C, and cleaning, deodorization, and decolorization were performed with enzyme deactivation. Then, the filter aid was added, and it filtered with the filter press (cleaning), and dried by spray dry. The obtained mucopolysaccharide contained amino acid, hyaluronic acid, a glucosamine, etc., including 20 % of the weight of chondroitin sulfate, and 30 % of the weight of collagens. Yield was 6%.

[0047] Next, the health food (tablet) which uses as a principal component the mucopolysaccharide (60 % of the weight of chondroitin contents) manufactured by this invention was created, human being sampled actually, and the situation was investigated. The mucopolysaccharide contains 60 % of the weight of chondroitin sulfate, 10 % of the weight of collagens, 20 % of the weight of amino acid, and 2.0 % of the weight of hyaluronic acid. 12-grain (3.6g) intake of the tablet which is 300mg per grain with which the lactose was blended with for beer yeast in 3.0 % of the weight 7.0% of the weight 8.0% of the weight, and sucrose fatty acid ester was blended [ vitamin C ] for the difficulty slaking property dextrin in it 10.0% of the weight 45.5% of the weight was carried out to this mucopolysaccharide at the day. An intake period is 30 days. Consequently, the result of a table 1 was obtained.

[0048]

[A table 1]

氏名 (イニシャル)	年齢	性別	試飲結果
MS	20代	女性	一週間程で肌に潤い感じた。
YU	20代	女性	10日位で、友人に最近肌が綺麗になったねと言われた。
RA	20代	女性	便秘が解消した。
AO	30代	女性	朝起きた時に肌のハリを感じる。化粧のりがよくなった。
TW	30代	女性	少し痩せた。
YO	30代	女性	生理時の吹き出物が無かった。
MK	30代	男性	利尿数が増えた。
YI	30代	男性	マラソンで傷めた関節痛が楽になった。
YK	40代	女性	関節の痛みが和らいだ。
KN	40代	女性	元気になった気がする。
MI	40代	女性	肌にハリが出てきた気がする。
KT	40代	男性	かすみ目が治った。
MK	40代	男性	疲れがとれた。
HY	50代	女性	関節の傷みが無くなった。二枚爪が治った。
NT	50代	女性	肌のハリを感じる。
MK	50代	女性	関節の傷みが無くなった。
HM	60代	女性	関節の傷みが無くなった。
TS	60代	女性	肌の調子が良くなった。
TK	60代	男性	関節の傷みが無くなった。

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(54) 【発明の名称】 ムコ多糖類及びその製造方法

(57) 【要約】

【課題】 なるべく低コストで短時間にムコ多糖類を製造できる方法を提供する。

【解決手段】 魚類の軟骨を、酵素処理もしくはアルカリ処理して得た水溶液を、脱脂、脱臭、脱色、ろ過し、乾燥することにより、ムコ多糖類を製造する。もしくは、魚類の軟骨を、加圧処理して得た水溶液を、酵素処理し、脱脂、脱臭、脱色、ろ過し、乾燥することにより、ムコ多糖類を製造する。本発明によれば、短時間に低コストでコンドロイチン硫酸などのムコ多糖類を製造できるようになる。また、製造されたムコ多糖類は、例えば化粧品原料又は食品素材として利用される。



## 【特許請求の範囲】

【請求項1】 魚類の軟骨を、酵素処理もしくはアルカリ処理して得た水溶液を、脱脂、脱臭、脱色、ろ過し、乾燥することを特徴とする、ムコ多糖類の製造方法。

【請求項2】 魚類の軟骨を、加圧処理して得た水溶液を、酵素処理もしくはアルカリ処理し、脱脂、脱臭、脱色、ろ過し、乾燥することを特徴とする、ムコ多糖類の製造方法。

【請求項3】 請求項1又は2の製造方法によって製造されたことを特徴とする、ムコ多糖類。

【請求項4】 化粧品原料又は食品素材であることを特徴とする、請求項3に記載のムコ多糖類。

## 【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、魚類の軟骨から製造されるムコ多糖類に関する。

【0002】

【従来の技術】例えば蛙の鼻軟骨などといった魚類の軟骨中には、コンドロイチン硫酸などのムコ多糖類が存在することが、これまでの調査研究で明らかになっている。また最近では、蛙の鼻軟骨由来のコンドロイチン硫酸を化粧品や食品などに利用することが検討されている。

【0003】従来、蛙の鼻軟骨などからムコ多糖類を製造する方法として、特開2001-231497や特開2001-247602が開示されている。これら従来の方法では、蛙の鼻軟骨などをマイナス30～60℃で低温粉碎して脱脂した後、アルカリ処理・加熱して、酵素処理し、その消化液をエタノール沈殿・ろ過・遠心分離後、乾燥させさらにイオン交換樹脂による溶解・ろ過後凍結乾燥することによりコンドロイチン硫酸などのムコ多糖類を取得するようにしている。

【0004】

【特許文献1】 特開2001-231497号公報

【特許文献2】 特開2001-247602号公報

【0005】

【発明が解決しようとする課題】しかしながら、従来の製造方法では、ろ過の際にイオン交換樹脂を使用し多量のエタノールを必要とすることから、製造コストが高くなり、ムコ多糖類が相当に高額となってしまう。また、エタノール沈殿・ろ過・遠心分離を数回行うために製造に要する時間が長くなってしまう。

【0006】従って本発明の目的は、なるべく低コストで短時間にムコ多糖類を製造できる方法を提供することにある。

【0007】

【課題を解決するための手段】この目的を達成するため、本発明によれば、魚類の軟骨を、酵素処理もしくはアルカリ処理して得た水溶液を、脱脂、脱臭、脱色、ろ過し、乾燥することを特徴とする、ムコ多糖類の製造方

法が提供される。また本発明によれば、魚類の軟骨を、加圧処理して得た水溶液を、酵素処理し、脱脂、脱臭、脱色、ろ過し、乾燥することを特徴とする、ムコ多糖類の製造方法が提供される。

【0008】また本発明にあっては、このような製造方法によって製造されたムコ多糖類であることを特徴としている。こうして製造されたムコ多糖類は、例えば化粧品原料又は食品素材として利用される。

【0009】本発明において、魚類としては、例えば鮫、エイ、蛙などが例示される。また魚類の軟骨としては、例えば蛙の鼻軟骨が例示される。本発明にあっては、例えば魚類の軟骨を約120℃で1時間程度加圧し溶解させて得た水溶液を、酵素処理し、脱脂、脱臭、脱色、ろ過し、乾燥することにより、ムコ多糖類を製造する。本発明によれば、エタノール沈殿・ろ過・遠心分離後、乾燥させさらにイオン交換樹脂による溶解・ろ過後凍結乾燥の工程を省くことにより、短時間に低コストでコンドロイチン硫酸などのムコ多糖類を製造できるようになる。

【0010】なお、魚類の軟骨を溶解させる方法の相違により、製造されるムコ多糖類の組成は異なることとなる。本発明によって製造されたムコ多糖類からなる食品素材は、ビタミンCと配合しても褐変しなかった。

【0011】

【発明の実施の形態】以下、本発明の好ましい実施の形態を説明する。

【0012】まず、蛙の頭部から表皮、硬骨、肉などを除いて分離した鼻軟骨を得る。

【0013】次に、鼻軟骨を溶解させて水溶液を得る。この場合、鼻軟骨をアルカリ処理もしくは酵素処理して水溶液を得ることができる。また、例えば約120℃（1.2気圧）で1時間程度加圧し、鼻軟骨を溶解させても良い。

【0014】次に、得られた水溶液にタンパク分解酵素（プロテアーゼ）を混ぜる。

【0015】その後、不溶物を除去し、ろ過助剤を入れ、フィルタープレスでろ過する。この場合、脱臭の必要があるときは、活性炭を入れフィルタープレスでろ過する。

【0016】次に、水溶液をスプレードライで噴霧乾燥する。乾燥前に濃縮してもよい。こうして短時間に低コストでコンドロイチン硫酸を製造することができる。

【0017】こうして製造されたコンドロイチン硫酸は、いわゆるムコ多糖類であり、分析の結果、コンドロイチン硫酸が平均20～60重量%、コラーゲンが平均10～40重量%、アミノ酸20～40重量%の割合で分布している。また、少量のヒアルロン酸、グルコサミンも含まれている。

【0018】また、本発明の別の実施の形態によれば、魚類の軟骨をアルカリ又は酵素の少なくとも1つを用い

て溶解させて水溶液を得て、PH調整、ろ過、脱脂、脱臭、脱色、乾燥する。

【0019】具体的には、まず蛙の軟骨を40℃～50℃の温水で1時間～2時間洗浄する(脱脂・脱臭)。この場合、塩酸で洗浄してもよい(脱脂・脱臭)。この時軟骨には骨・皮及び魚肉が付着していてもよい。加圧処理及び高温で処理すると製品が変色することがある。

【0020】次いで、軟骨に同量の水を加え、この水溶液に固形分濃度0.2%のタンパク分解酵素(アロアーゼ)を入れ50℃～60℃で4時間攪拌して、水溶液を得る。

【0021】その後、95℃で5分間加熱し、酵素失活させる。

【0022】更に、活性炭を原料に対して2.5%の重量で添加し40℃～50℃で1時間～2時間攪拌し、脱脂・脱臭・脱色を行う。

【0023】次いで、酢酸でpHを5～6に調整する。

【0024】次いで、濾過助剤を加えフィルタプレスで濾過する(脱脂)。得られた水溶液を、濃縮してもよい。水溶液を放置し油分が浮く時は分液する(脱脂)。

【0025】次いで、スプレードライで乾燥する。

【0026】こうして得られたムコ多糖類は、コンドロイチン硫酸40%、コラーゲン20%を含み、その他、アミノ酸、ヒアルロン酸、グルコサミン等を含んでいる。

【0027】また、蛙の軟骨を40℃～50℃の温水で1時間～2時間洗浄する(脱脂・脱臭)。塩酸で洗浄してもよい(脱脂・脱臭)。この時軟骨には骨及び魚肉が付着していてもよい。加圧処理及び高温で処理すると製品が変色することがある。

【0028】次いで、軟骨の半分の水を加え、水溶液を得る。この水溶液にタンパク分解酵素(バンクレアチン)を0.1重量%、入れ40℃～50℃で1時間攪拌する。

【0029】次いで、90℃以上で10分間加熱し、酵素失活させる。

【0030】次いで、酢酸でpHを5～6に調整する。

【0031】次いで、濾過助剤を加え、脱臭後フィルタプレスで濾過する。得られた水溶液を、濃縮してもよい。水溶液を放置し油分が浮く時は分液する(脱脂)。

【0032】次いで、50重量%濃度のアルコールを水溶液を攪拌しながら加え、沈殿物を回収する。

【0033】次いで、回収した沈殿物を減圧乾燥する。

【0034】こうして得られたムコ多糖類は、コンドロイチン硫酸60重量%、コラーゲン10重量%を含み、その他、アミノ酸、ヒアルロン酸、グルコサミン等を含んでいる。

【0035】また、蛙の軟骨を40℃～50℃で1時間～2時間温水洗浄する(脱脂・脱臭)。塩酸で洗浄してもよい(脱脂・脱臭)。この時、軟骨には骨及び魚肉が

付着していてもよい。加圧処理及び高温で処理すると製品が変色することがある。

【0036】次いで、25重量%濃度のアルカリ(苛性ソーダ)を軟骨量に対し2重量%入れた水溶液を得る。この水溶液を50℃～60℃で4時間攪拌する。

【0037】次いで、酢酸でpHを6～7に調整する。

【0038】次いで、更に、活性炭を水溶液に対して0.3重量%の重量で添加し、80℃で15分間攪拌し、酵素失活と脱脂・脱臭・脱色を行う。

【0039】次いで、濾過助剤を加えフィルタプレスで濾過する(脱脂)。得られた水溶液を、濃縮してもよい。水溶液を放置し油分が浮く時は分液する(脱脂)。

【0040】次いで、スプレードライで乾燥させる。

【0041】こうして得られたムコ多糖類は、コンドロイチン硫酸20%、コラーゲン30%を含み、その他、アミノ酸、ヒアルロン酸、グルコサミン等を含んでいる。

【0042】

【実施例1】(実施例1) まず、蛙の頭部から表皮、硬骨、肉などを除いて分離した鼻軟骨を得た。そして、原料(鼻軟骨)に1.5倍の水を加え120℃で1時間圧力加熱し、鼻軟骨を溶解させて水溶液とした。その後、不溶物を除去し、固形分濃度に対して0.2重量%のタンパク分解酵素(プロテアーゼ)を入れ、60℃で1時間攪拌した。そして、95℃で5分間加熱し酵素失活させた。更に、活性炭を水溶液に対して0.3重量%の重量で添加し80℃で15分攪拌した(脱脂・脱臭・脱色)。次いで、ろ過助剤を入れフィルタプレスでろ過し、ろ過した水溶液を噴霧乾燥してムコ多糖を得た。得られたムコ多糖の分析値では、乾燥減量7重量%、灰分5重量%、塩分0.2重量%、脂肪0.3重量%、全窒素11重量%、タンパク質62重量%、コンドロイチン硫酸30重量%、コラーゲン40重量%を含んでいた。

【0043】(実施例2) まず、蛙の軟骨を50℃の温水で2時間洗浄した。この軟骨に同量の水を加え、原料の0.2重量%のタンパク分解酵素(アロアーゼ)を入れ、50℃で4時間攪拌して水溶液とした。その後、95℃で5分間加熱し、酵素失活させた。更に、活性炭を原料に対して2.5重量%の重量で添加し、50℃で2時間攪拌し、脱脂・脱臭・脱色を行った。そして、pHを6に調整した後、濾過助剤を加え、フィルタプレスで濾過(脱脂)した。更に、スプレードライで乾燥してムコ多糖を得た。得られたムコ多糖類は、コンドロイチン硫酸40重量%、コラーゲン20重量%を含み、その他、アミノ酸、ヒアルロン酸、グルコサミン等を含んでいた。収率は6.5%であった。

【0044】(実施例3) まず、蛙の軟骨を45℃の温水で2時間洗浄した(脱脂・脱臭)。その軟骨に半分の水を加え、これにタンパク分解酵素(バンクレアチン)を0.1重量%入れ、50℃で2時間攪拌して水溶液を

得た。そして、90℃以上で10分間加熱し、酵素失活させた。更に、酢酸でpHを6に調整してから、濾過助剤を加え、脱臭後フィルタープレスで濾過した。更に、50重量%濃度のアルコール水溶液を攪拌しながら加え、沈殿物を回収し、回収した沈殿物を減圧乾燥した。得られたムコ多糖類は、コンドロイチン硫酸60重量%、コラーゲン10重量%を含み、その他、アミノ酸、ヒアルロン酸、グルコサミン等を含んでいた。収率は3%であった。

【0045】(実施例4) 先ず、蛙の軟骨を45℃の温水で2時間洗浄した(脱脂・脱臭)。その軟骨量に対し、25重量%濃度のアルカリ(苛性ソーダ)を2重量%入れ、これを55℃で4時間攪拌し水溶液を得た。そして、酢酸でpHを7に調整し、更に、活性炭を水溶液に対して0.3重量%の重量で添加し、80℃で15分間攪拌し、酵素失活と脱脂・脱臭・脱色を行った。その後、濾過助剤を加え、フィルタープレスで濾過(脱脂)し、スプレードライで乾燥した。得られたムコ多糖類は、コンドロイチン硫酸20重量%、コラーゲン30重量%を含み、その他、アミノ酸、ヒアルロン酸、グルコサミン等を含んでいた。収率は5%であった。

【0046】(実施例5) 蛙の頭部から表皮、硬骨、肉などを除いて分離した鼻軟骨を得た。そして、原料(鼻軟骨)に1.5倍の水を加え120℃で1時間圧力加熱し、鼻軟骨を溶解させて水溶液とした。その後、不溶物\*

を除去し、その軟骨量に対し、25重量%濃度のアルカリ(苛性ソーダ)を2重量%入れ、これを55℃で4時間攪拌した。そして、酢酸でpHを7に調整し、更に、活性炭を水溶液に対して0.3重量%の重量で添加し、80℃で15分間攪拌し、酵素失活と脱脂・脱臭・脱色を行った。その後、濾過助剤を加え、フィルタープレスで濾過(脱脂)し、スプレードライで乾燥した。得られたムコ多糖類は、コンドロイチン硫酸20重量%、コラーゲン30重量%を含み、その他、アミノ酸、ヒアルロン酸、グルコサミン等を含んでいた。収率は6%であった。

【0047】次に、本発明によって製造されたムコ多糖類(コンドロイチン含有量60重量%)を主成分とする健康食品(錠剤)を作成し、実際に人間が試飲して様子を調べた。ムコ多糖類は、コンドロイチン硫酸60重量%、コラーゲン10重量%、アミノ酸20重量%、ヒアルロン酸2.0重量%を含んでいる。このムコ多糖類に対して、ビタミンCを8.0重量%、ビール酵母を7.0重量%、乳糖を45.5重量%、難消化性デキストリンを10.0重量%、ショ糖脂肪酸エステルを3.0重量%が配合された一粒300mgの錠剤を、一日に12粒(3.6g)摂取した。摂取期間は30日である。その結果、表1の結果を得た。

【0048】

【表1】

氏名(イニシャル)	年齢	性別	試飲結果
MS	20代	女性	一週間程で肌に潤い感じた。
YU	20代	女性	10日位で、友人に最近肌が綺麗になったねと言われた。
RA	20代	女性	便秘が解消した。
AO	30代	女性	朝起きた時に肌のハリを感じる。化粧のりがよくなった。
TW	30代	女性	少し痩せた。
YO	30代	女性	生理時の吹き出物が無かった。
MK	30代	男性	利尿数が増えた。
YI	30代	男性	マラソンで傷めた関節痛が楽になった。
YK	40代	女性	関節の痛みが和らいだ。
KN	40代	女性	元気になった気がする。
MI	40代	女性	肌にハリが出てきた気がする。
KT	40代	男性	かすみ目が治った。
MK	40代	男性	疲れがとれた。
HY	50代	女性	関節の痛みが無くなった。二枚爪が治った。
NT	50代	女性	肌のハリを感じる。
MK	50代	女性	関節の痛みが無くなった。
HM	60代	女性	関節の痛みが無くなった。
TS	60代	女性	肌の調子が良くなった。
TK	60代	男性	関節の痛みが無くなった。

【0049】

【発明の効果】本発明によれば、低コストで短時間にム

コ多糖類を製造できるようになる。また、一素材から、コンドロイチン硫酸とコラーゲン、アミノ酸、ヒアルロ

(5)

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ン酸、グルコサミンから組成される優良な化粧品原料、

食品素材を製造できる。